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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,934	09/29/2003	Fred Gehrung Gustavson	YOR920030331US1	8288

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MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC  
8321 OLD COURTHOUSE ROAD  
SUITE 200  
VIENNA, VA 22182-3817

EXAMINER
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DO, CHAT C

ART UNIT	PAPER NUMBER
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2193

MAIL DATE	DELIVERY MODE
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10/04/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

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**Office Action Summary**

Application No.

10/671,934

Applicant(s)

GUSTAVSON ET AL.

Examiner

Chat C. Do

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2193

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --****Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 5/3/07; 6/19/07; 7/16/07; 8/8/07.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3, 6-12, 14-19 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-12, 14-19 and 21-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| <p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br/>Paper No(s)/Mail Date <u>5/3/07; 6/19/07; 7/16/07; 8/8/07</u>.</p> | <p>4) <input type="checkbox"/> Interview Summary (PTO-413)<br/>Paper No(s)/Mail Date. _____.</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application</p> <p>6) <input type="checkbox"/> Other: _____.</p> |
|---|--|

### **DETAILED ACTION**

1. This communication is responsive to Amendment filed 07/16/2007.
2. Claims 1-3, 6-12, 14-19, and 21-23 are pending in this application. Claims 1, 9, 14, and 19 are independent claims. In Amendment, claims 4-5, 13, and 20 are cancelled and claims 21-23 are added. This Office Action is made non-final after a RCE filed 07/16/2007.

#### ***Claim Objections***

3. Claim 23 is objected to because of the following informalities:

Re claim 23, it is exactly the same as claim 21.

Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-3, 6-12, 14-19, and 21-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 1, the limitation “determining which matrix will have data...a lower level cache of said computer” is unclear as how it relates to other limitations of the claim since the multiplication processing only needs the data from higher level cache as L2.

For examination purposes, the examiner disregards the limitation. Claims 9, 14, and 19 have the similar rejection.

Thus, claims 2-3, 6-8, 10-12, 15-18, and 21-23 are also rejected for being dependent on the rejected based claims 1, 9, 14, and 19.

***Claim Rejections - 35 USC § 101***

6. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

7. Claims 1-3, 6-12, 14-19, and 21-23 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1-3, 6-12, 14-19, and 21-23 cite a method, apparatus, and medium for performing matrix multiplication in computer in accordance with a mathematical algorithm. In order for claims to be statutory, claims must either include a practical/physical application or a concrete, useful, and tangible result. However, claims 1-3, 6-12, 14-19, and 21-23 merely disclose steps/components for performing matrix multiplication in computer without further disclosing a practical/physical application or a useful and tangible result since the claims appear to preempt every substantial practical application of the idea embodied by the claim and there is no cited limitation in the claims that breathes sufficient life and meaning into the preamble so as to limit it to a particular practical application rather than being so broad and sweeping as to cover every substantial practical application of the idea embodied therein. Therefore, claims 1-3, 6-12, 14-19, and 21-23 are directed to non-statutory subject matter.

*Claim Rejections - 35 USC § 102*

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-3, 6-12, and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Pingali et al. (U.S. 6,357,041).

Re claim 1, Pingali et al. disclose in Figures 1-4 a method of improving at least one of speed and efficiency when executing a linear algebra subroutine on a computer having a memory hierarchical structure including at least one cache (e.g. abstract and col. 3 lines 3-18), said method comprising: determining, for a level 3 matrix multiplication processing, which matrix will have data for a submatrix block residing in a lower level cache of said computer and which two matrices will have data for submatrix blocks residing in at least one higher level cache or a memory (e.g. col. 3 lines 8-28 and col. 6 lines 40-68 wherein the two submatrices are the corresponding block of sub-divided matrix); and streaming data from said selected two matrices for executing said level 3 matrix multiplication processing (e.g. col. 16 lines 47-68 and col. 4 lines 56-68).

Re claim 2, Pingali et al. further disclose in Figures 1-4 at lower level cache comprises an L1 cache and said higher level cache comprises an L2 cache (e.g. col. 1 lines 24-28, col. 2 lines 60-65, and col. 4 lines 56-68).

Re claim 3, Pingali et al. further disclose in Figures 1-4 determining said matrix to be stored in said lower level cache comprises determining which of the three matrices has a smallest size (e.g. col. 14 lines 18-26).

Re claim 6, Pingali et al. further disclose in Figures 1-4 data for said second matrix and said third matrix streams into said L1 cache from said L2 cache such that said data from one of said second matrix and said third matrix streams in a vector format and data from the other of said second matrix and said third matrix streams in a vector format into said L1 cache (e.g. Figure 4).

Re claim 7, Pingali et al. further disclose in Figures 1-4 linear algebra subroutine comprises a substitute of a subroutine from a LAPACK (Linear Algebra PACKage) (e.g. col. 5 lines 1-14 as alternative).

Re claim 8, Pingali et al. further disclose in Figures 1-4 substitute subroutine comprises a BLAS Level 3 routine or a BLAS level 3 kernel routine (e.g. col. 5 lines 1-14 as alternative).

Re claim 9, it is an apparatus claim having similar limitations cited in claim 1. Thus, claim 9 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 10, it is an apparatus claim having similar limitations cited in claim 3. Thus, claim 10 is also rejected under the same rationale as cited in the rejection of rejected claim 3.

Re claim 11, it is an apparatus claim having similar limitations cited in claim 7. Thus, claim 11 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

Re claim 12, it is an apparatus claim having similar limitations cited in claim 8. Thus, claim 12 is also rejected under the same rationale as cited in the rejection of rejected claim 8.

Re claim 14, it is a medium claim having similar limitations cited in claim 1. Thus, claim 14 is also rejected under the same rationale as cited in the rejection of rejected claim 1.

Re claim 15, it is a medium claim having similar limitations cited in claim 3. Thus, claim 15 is also rejected under the same rationale as cited in the rejection of rejected claim 3.

Re claim 16, it is a medium claim having similar limitations cited in claim 7. Thus, claim 16 is also rejected under the same rationale as cited in the rejection of rejected claim 7.

Re claim 17, it is a medium claim having similar limitations cited in claim 8. Thus, claim 17 is also rejected under the same rationale as cited in the rejection of rejected claim 8.

Re claim 18, it is a medium claim having similar limitations cited in claim 6. Thus, claim 18 is also rejected under the same rationale as cited in the rejection of rejected claim 6.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pingali et al. (U.S. 6,357,041) in view of Philip et al. ("PLAPACK: Parallel Linear Algebra Package Design Overview").

Re claim 19, Pingali et al. disclose in Figures 1-4 a method of providing a service involving at least one of solving and applying a scientific/engineering problem (e.g. col. 1 lines 21-28), said method comprising at least one of: using a linear algebra software package that performs one or more matrix processing operations (e.g. col. 5 lines 1-18 and col. 6 lines 9-22), said method comprising streaming data for matrices involved in processing said linear algebra subroutines such that data is processed using data for a first matrix stored in a cache as a matrix format and data from a second matrix and a third matrix is stored in a memory device at a higher level than said cache (e.g. col. 3 lines 1-27 and col. 4 lines 25-68), said streaming providing data from said higher level in a manner as said data is required for said processing (e.g. abstract and col. 2 lines 57-68).

Pingali et al. fail to disclose providing a consultation for solving a scientific/engineering problem using said linear algebra software package; transmitting a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed



version representing said result; and receiving a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result. However, Philip et al. disclose a step of providing a consultation for solving a scientific/engineering problem using said linear algebra software package; transmitting a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result; and receiving a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result (e.g. abstract and page 1 under the instruction section wherein the library is distributed to network processors for processing).

Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add providing a consultation for solving a scientific/engineering problem using said linear algebra software package; transmitting a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result; and receiving a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result as seen in Philip et al.'s invention into Pingali et al.'s invention because it would enable to perform highly and parallel computation (e.g. page 1 under the introduction section).

12. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pingali et al. (U.S. 6,357,041) in view of Myszewski (U.S. 5,099,447).

Re claims 21 and 23, Pingali et al. fail to disclose in Figures 1-4 selecting, from a plurality of six kernels, two kernels optimal to use for executing said level 3 matrix multiplication processing as data streams from different levels of said M levels of cache, such that said processor switches back and forth between said two selected kernels as steaming data traverses said different levels of cache. However, Myszewski discloses in Figure 5 the step of selecting, from a plurality of six kernels, two kernels optimal to use for executing said level 3 matrix multiplication processing as data streams from different levels of said M levels of cache, such that said processor switches back and forth between said two selected kernels as steaming data traverses said different levels of cache (e.g. col. 4 lines 55-64, col. 14 lines 34-55, cols. 15-18 wherein a submatrix or block of matrix is selected and stream down to a cache for processing in order to prevent overflow cache).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add the step of selecting, from a plurality of six kernels, two kernels optimal to use for executing said level 3 matrix multiplication processing as data streams from different levels of said M levels of cache, such that said processor switches back and forth between said two selected kernels as steaming data traverses said different levels of cache as seen in Myszewski's invention into Pingali et

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al.'s invention because it would enable to reduce computation stalling by optimizing the instruction (e.g. abstract).

Re claim 22, it is a medium claim having similar limitations cited in claim 21.

Thus, claim 22 is also rejected under the same rationale as cited in the rejection of rejected claim 21.

### ***Response to Arguments***

13. Applicant's arguments with respect to claims 1-3, 6-12, 14-19, and 21-23 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chat C. Do whose telephone number is (571) 272-3721. The examiner can normally be reached on M => F from 7:00 AM to 5:30 PM.

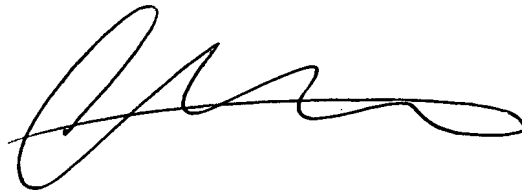
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chat C. Do  
Examiner  
Art Unit 2193

September 25, 2007

A handwritten signature in black ink, appearing to read 'Chat C. Do', with a large, sweeping horizontal stroke at the end.